

HYDRAULIC-ELECTRONIC CONTROL EQUIPMENT FOR HIGH RESPONSE CHEMICAL/INDUSTRIAL PROCESSES.

Have you ever seen an absolutely straight control line in a working process? Have you ever had a valve with 5000 to 1 turndown?

Have you ever seen a modulating valve with full stroke speed of 0.1 seconds? Or - a safety valve which can open or close in 25 milliseconds and be reset immediately? Or - a simple manifold which converts any cylinder on single seated valves to a field setting relief valve with electrical override?

With Bafco Equipment, you can!

Bulletin HC

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GENERAL DESCRIPTION AND FEATURES

THESE PRODUCTS ARE HIGH RESPONSE, HIGH SPEED, VERY HIGH RELIABILITY HYDRAULIC-ELECTRONIC AND ELECTRONIC DEVICES CAPABLE OF CONTROL OF DIFFICULT PROCESSES. MANY OF THEM ALSO HAVE BUILT-IN PROVISIONS AND REDUNDANT SAFETIES CAPABLE OF BRINGING SUCH PROCESSES TO PRESET SAFE CONDITIONS.

All of our equipment has been designed to a practical industrial construction standard for this specialized class, and is furnished in assemblies that result in fast field installation and checkout of easily maintained equipment. These products include hydraulic-electronic actuators, hydraulic power units, field manifolds and piping accessories to complete a plant system – and matching electronic controllers, servo-amplifiers and transducer conditioners which provide the characteristics needed to achieve the fine control and safety this equipment offers.

WHY HYDRAULICS?

The key technique in difficult process control is to make the control loop faster than the process. This requires final element positioning of high dynamic response. Hydraulic-electronic positioners have the basic high stiffness and precise and rapid reversal capabilities which produce infinite resolution of valve position with high frequency response. As a rule, the better these characteristics, the faster and more precise the return to control after an upset.

The equipment we provide furnishes you the hydraulic-electronic expertise within itself. As we furnish all test and installation accessories, you do not have to be an expert to use this class of system. The components described in this bulletin are all you need.

NEW HYDRAULIC STANDARDS AND DESIGN PROVIDE ESSENTIALLY LEAK-FREE OPERATION. ANY OF THIS EQUIPMENT CAN BE FURNISHED WITH NEW BENIGN FIRESAFE HYDRAULIC FLUIDS.

This bulletin of high response controls and positioning systems is only a part of what we manufacture. Call us for other catalogs or more specific information.

VALVE ACTUATORS

Hydraulic-electronic actuators are basic to high speed control systems. Only this type of drive offers for plant use the practical range of power which can be modulated or directed with very high speed of response characteristics. Bafco offers a wide range of actuators for all plant requirements, including these for process valves:

THROTTLING ACTUATORS

- Thrust level from 1000 to 160,000 pounds
- Resolution from 1/1,000 to 1/10,000 of stroke
- Frequency response to 30 Hz or higher if needed
- Stroke from 0.1 to 4 inches (see bulletin HS for longer strokes)
- Models 707/728/730/744/760 for linear valves
- Model 759 for rotary valves



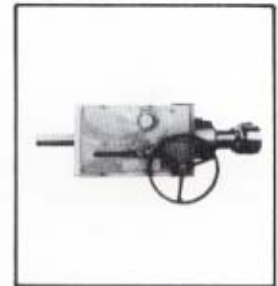
Model 707 throttling actuator as furnished for mounting on valve.



Model 743 throttling actuator with high temperature split-body valve.



Model 760 throttling actuator on catalyst control valve.



Model 759 rotary actuator

ON-OFF ACTUATORS WITH SAFETY FAILURE MODE

- Thrust from 1,000 to 160,000 pounds
- Vent or block mode can be field selected
- Full stroke speed at fast as 25 milliseconds, with resetting speed of 0.5 to 2 seconds
- Stroke from 0.1 to 4 inches (see bulletin HS for longer strokes)
- Available with manual locks
- Models 716/729/732/744



Model 729 high speed safety vent valve actuator mounted on very high pressure safety valve.



Model 716 High Speed Safety Vent Actuator with Minimum Pressure Spring



Model 734L On-Off Actuator with Manual Lock

GENERAL FEATURES

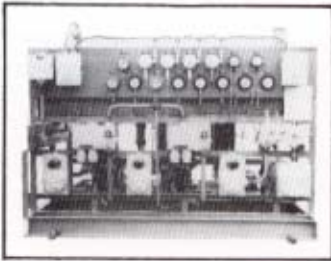
- Dynamic seals to environment are not under pressure
- Temperature range minus 40° to 180°F or more
- Hydraulic pressures from 250 to 3000 PSI. Standard, firesafe and water base fluids
- All models are self-purging. No airbleeds needed
- Very short range (0.005 to 0.1 inch) snubbers are furnished to protect the equipment without causing control problems at ends of stroke
- A redundant safety mode can be furnished
- Yokes furnished for mounting on any valve
- These actuators can be shipped to you for field assembly, or we will mount and test with your valve.

HYDRAULIC POWER UNITS

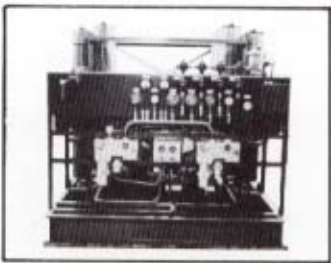
All Bafco actuators and field manifolds can be used with any existing hydraulic power unit. The hydraulic power units described here are particularly designed for very high reliability with insignificant maintenance for continuous industrial processes.

There are two types of installations - Central Units which furnish oil supply to an entire system or plant (a single unit for 20-25 actuators is not unusual), and Dedicated Units to operate a single valve or two valves without the need for oil piping in the plant.

CENTRAL POWER UNITS



717-2 Pre HPU with Prefilter

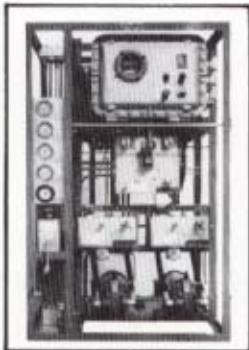


Central HPU for 24 actuators

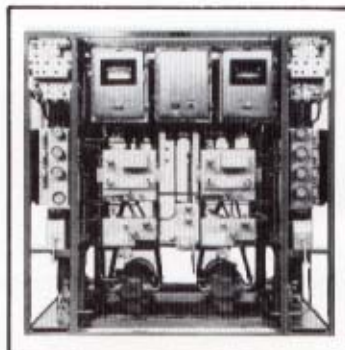
- Single, dual or triple lines on a single skid with controls and safeties for auto startup of spare lines.
- Large area fixed components are stainless steel - such as tank, filters, heat exchanger, piping and flanges.
- No taper pipe connections - all flanged or straight thread.
- Accumulators for power storage or high speed modulation.
- All components are in suction and high pressure manifolds.
- Pressure 250 to 3000 PSI. Standard, fire-safe and water base fluids.
- Flow 5 to 50 GPM with 5 to 25 GPM standby.
- One line can be operated from steam turbine.
- Model 717 is the basic unit. Model 717 pre is a dual tank unit that includes a precleaning system to make this the most complete self-contained hydraulic power unit available.

DEDICATED POWER UNITS

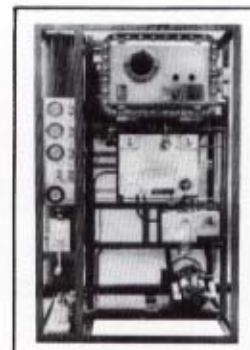
- Single or dual pumping systems in a single unit with auto startup of spare line.
- One line can be operated by air motor.
- Very small size for location within plant units.
- Flow 1 to 5 GPM with 1 to 5 GPM standby.
- Other specs as above.
- Model 769 for one actuator
- Model 779 for two actuators



Model 769 with dual power system



Model 779 with dual system for two actuators.



Model 769 with single power system

FIELD STATIONS AND ACCESSORIES

Where the HPU is mounted near the actuator, the hydraulic and manual controls and accumulators are made a part of a dedicated HPU if possible. This results in a very small and light installation on the valve, and ease of maintenance. Where a central HPU is a long distance from the actuators, we furnish the hydraulic components and accumulators as part of field manifolds easily mounted near the actuators. Separation of actuator and controls is very practical over very long distances.

FIELD MANIFOLDS

When a central HPU skid is used, all positioner control functions are a part of a local field manifold assembly that may include hydraulic control valves, filters, lock-up and safety valves, pressure switches, etc. Also, manual pumps are an optional part of these units.

The field manifolds are furnished as a steel frame unit, wall or floor mounted as an assembly. The valve function determines the field manifold components and many types are available for all valve applications.

Model 713-1 basic unit for throttling type valve

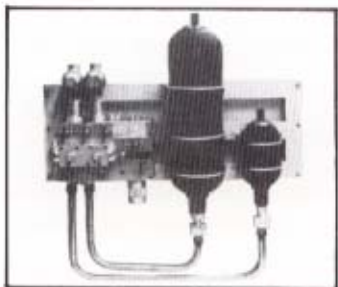
Model 713-2 to produce a pressure balance relief valve with electrical four-way valve auxiliary.

Model 713-3 and -7 with low and high flow four-way solenoid valves.

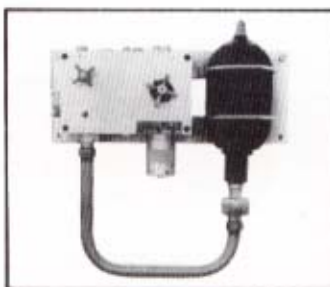
Model 713-4 to produce a pressure balance relief valve.

Model 713-6 with redundant four-way valves for the ultimate in safety.

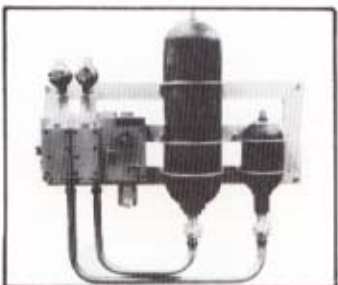
Model 713-8 with lock-in ESD oil storage.



Model 713-8 Field Manifold
With ESD Lock-In Storage



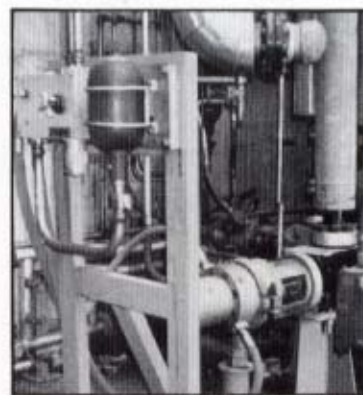
Basic 713-1 Field Manifold



713-6 with Redundant
Safety Valves



713-2 for Pressure Balanced
Relief Valve with Auxiliary
Electrical Operation



Typical field installation of 713-1
manifold and 707 actuator.

FIELD INSTALLATION ACCESSORIES

Bafco provides all of the components needed to field install and startup our equipment. Procedures are also furnished to simplify what is otherwise a difficult project. Some of these accessories are:

- Stainless steel socket weld SAE hydraulic flanges.
- Flushing blocks are provided with each field manifold, and for each throttling actuator.
- Flushing blocks are built into each vent/block actuator.
- Flushing fittings are furnished with each HPU.
- All Bafco hydraulic equipment is shipped hydrostatically tested, cleaned and capped.

CONTROLS

Because of the high response capability of Bafco hydraulic equipment, specialized electronic control products are an integral part of a high speed process system. The basic unit used to operate hydraulic-electronic equipment is a servoamplifier, which completes the position or velocity loop of the actuator. It is furnished for use with any industrial controller command signal and can include shutdown and safety logic. It is built in as part of Bafco controls, all of which can be set up for remote operation from programmer or computer. Typical units are:

- **MODEL 855 CONTROLLER:** A complete unit which includes strain gage power supply and amplifier, three mode controller and servoamplifier in a single 8-1/2" panel or half relay rack case. The 855 is also available for any voltage or current signal. This unit is all that is required to control a hydraulic-electronic actuator from a process signal, with the bandwidth needed for high response systems.
- **MODEL 851 STRAIN GAGE AMPLIFIER** with continuously adjustable filters to prevent compressor pulsation, etc. from affecting the process valve.

Many servoamplifiers are available with independent adjustments for velocity of actuator in both directions, for stroke limits open and close, and with adjustable rounding into position to avoid shock.

Strain gage break protection is also available to provide the equivalent of T.B.C. in most any form of failure of a strain gage. This unit provides a high/low controller signal and a relay output.

- **MODEL 842 BASIC SERVOAMPLIFIER** to operate an actuator from your controller commands.
- Many complete controller models are also available for specific pressure, flow, temperature and load systems.



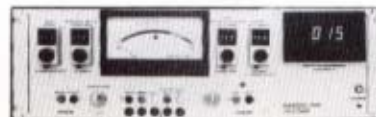
Basic 855 Controller



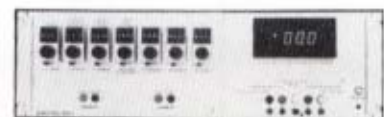
Basic 842 MS Servoamplifier



Multiple Controller -
Servoamplifier



Complete Controller -
Servoamplifier with Auxiliary
Controls



Controller - Servo-
amplifier with Operating Limits

OTHER PRODUCTS

- Bulletin HB** - Butterfly and ball valve actuators. Refinery expander valve actuators.
- Bulletin HP** - Refinery plug valve actuators.
- Bulletin HS** - Long stroke actuators. Refinery slide valve actuators.
- Bulletin F** - Frequency response analyzers. Servo analyzers.